



California Regional Water Quality Control Board Central Valley Region

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REVIEW OF 2007 ANNUAL MONITORING REPORT – CALIFORNIA RICE COMMISSION

On 26 December 2007, the California Rice Commission (CRC) submitted its Annual Monitoring Report (AMR) as required by Resolution No. R5-2006-0053 Coalition Group Conditional Waiver of Waste Discharge Requirements for Discharges from Irrigated Lands and CRC Monitoring and Reporting Program (MRP) Order No. R5-2004-0839. The CRC consolidated reporting by including in the submittal the monitoring and reporting required by the Rice Pesticide Program in Resolution No. R5-2007-018.

The five sites sampled and reported in the AMR for 2007 were:

- BS1 – Butte Slough at Lower Pass Road
- SSB – Sacramento Slough Bridge near Karnak
- CBD1 – Colusa Basin Drain above Knights Landing
- CBD5 – Colusa Basin Drain #5
- JS – Jack Slough

The first four sites have historically been monitored by the CRC as part of the Rice Pesticide Program. The fifth site, Jack Slough (JS), rotates with Lower Coon Creek (LCC) to characterize rice field discharges from the Lower Feather River. Site SSB replaced the location at Sacramento Slough near Karnak (SS1), but can be considered the same site due to its proximity.

AMR MONITORING SUMMARY

Toxicity tests

The CRC continued to collect and perform toxicity tests for *Pimephales*, *Ceriodaphnia*, and *Selenastrum*, although testing was not required under MRP Order No. R5-2004-0839. No statistically significant toxicity was observed for *Pimephales* for any sampling event

No statistically significant *Ceriodaphnia* toxicity was found in any sampling event other than 18 September 2007 for the CBD1 sample. Resampling was triggered due to the 100% mortality, and a Phase I TIE was performed. The TIE results indicated a non-polar organic chemical(s) contributed to the toxicity. Inorganics and cationic metals were determined to be non-contributors to the toxicity. No statistically significant toxicity to *Ceriodaphnia* was found in the resample taken 21 September. This is the second *Ceriodaphnia* toxicity hit at CBD1. A

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management plan is triggered by the second exceedance according to Regional Board Order R5-2006-0053.

In the previous two years of *Selenastrum* toxicity tests, Toxicity Identification Evaluations (TIEs) have not provided adequate information to identify toxicants. The CRC and Regional Water Board staff agreed to modify the procedure so that $\geq 50\%$ growth reduction would not trigger a TIE or dilution series. Growth reduction of $\geq 50\%$ would still trigger a resampling event. Herbicide and copper analyses would be conducted on samples collected at CBD1 in July and at BS1, CBD5, and SSB in September to identify the possible cause of *Selenastrum* toxicity. The list of herbicides analyzed for 2007 is shown in Table 1.

Results from the *Selenastrum* toxicity tests are shown in Table 2. No herbicides were detected in any of the samples analyzed in July and September, although SSB showed a 70% growth reduction in September. Copper was not detected in the samples at a reporting limit of 20 $\mu\text{g/L}$. The CRC has been advised that the Irrigated Lands Regulatory Program (ILRP) reporting limit for copper in the Coalition Group MRP Order R5-2008-005 is 0.5 $\mu\text{g/L}$.

Sampling for sediment toxicity tests with *Hyalella* occurred in July and September. In July, Nautilus Environmental, the sediment toxicity test lab, reported that several sample bottles were broken. Resampling occurred within 4 days at those sites with broken bottles. No statistically significant sediment toxicity was found in the samples.

The September sediment toxicity samples were received at Nautilus five days after the sampling date with sample temperatures of 23.8°C. Duplicate samples were shipped from AQUA-Science and received within 24 hours at the proper hold temperature. No statistically significant sediment toxicity was found for these samples.

It should be noted that the CRC and Regional Water Board staff are currently working on a Management Plan for *Selenastrum* toxicity at all CRC sampling sites due to exceedances in previous sampling.

Pesticides

In accordance with CRC MRP Order No. R5-2004-0839, cyhalofop butyl was analyzed with three fungicides: azoxystrobin, propiconazole, and trifloxystrobin. Samples collected from April through September showed no detection of these pesticides at the laboratory reporting limit of 0.05 $\mu\text{g/L}$.

General Parameters

Tables with field measurements were presented for temperature, pH, dissolved oxygen (DO), electrical conductivity (EC), total dissolved solids (TDS), and turbidity. In addition, scatter graphs were presented for each parameter showing readings for each sampling date.

The CRC and Regional Water Board staff are currently working on a Management Plan for pH and DO at all CRC sampling sites due to exceedances in previous sampling.

UCD Monitoring

The CRC AMR contained data for Study Component #2 that focused on peripheral drain monitoring. Reported data include DO, pH, EC, and temperature monitoring data for four rice fields. UC Davis will present results from this monitoring and other Study Components in quarterly progress reports that are submitted as part of the overall grant. Results have been analyzed and are currently being summarized and reviewed.

AMR REVIEW

The review for the 2007 AMR is summarized in the following three sections:

- I. Correctable items
- II. General quality control (QC) findings
- III. General comments on the AMR

I. Correctable Items

The following corrections should be made to the AMR text:

- Page 2-5; Tables 2-1 to 2-6 refer to pesticide use for Sacramento County rather than counties in the Sacramento Valley. Table 2-9 and 2-10 refer to pesticide use for San Joaquin rather than counties in the San Joaquin Valley.
- Page 5-4; BS1 experienced its lowest dissolved oxygen (DO) concentration during the September (not August) sampling event since August data was not acceptable due to instrument malfunction.
- Page 5-16; the second bullet indicates no significant toxicity was observed in February and April through October. The bullet should indicate no statistically significant toxicity for *Ceriodaphnia* was observed in February, April through October, except for the September sample taken at CBD1.
- Page 5-27; misprint in last paragraph stating *H. azteca* toxicity sampling in “July” rather than October.
- Table 5-10; the column heading should note % Growth, not % Survival
- Table 5-10; the *Selenastrum* toxicity data for 27 February sampling are in conflict with the lab sheets (see Table 2 attached with data from lab sheets).
- Table 5-10; for the 8 May sample remove “Y” for BS1 and insert “Y” for SSB to indicate resampling triggered for SSB, not BS1.
- Table 5-15; the correct component number for the UC Davis tabled data is “Component 2”.
- Page 7-1; the last paragraph on the page should be rewritten or eliminated since it contradicts the next paragraph on Page 7-2.

II. General Quality Control Findings

- The AQUA-Science laboratory log-in sheets that record the receiving temperature, DO, pH, hardness/alkalinity, ammonia, and conductivity of each sample are not in the AMR. These data are required under the QAPP to ensure sample hold times and temperatures are in accordance with EPA protocol. A list of samples, sample identification, and sample dates for the missing sample receipt log-in data is attached to this memorandum as Table 3.

- The field logs for sediment samples taken 11 July, 16 July and 19 September are missing from the AMR. Copies of the missing field logs that include general parameters and flow rates are required under the MRP Order.
- Environmental Micro Analysis, Inc. (EMA) used a non-EPA or an alternative analytical procedure to analyze for azoxystrobin, trifloxystrobin, propiconazole, and cyhalofop butyl. In accordance with EPA guidelines and ILRP requirements, documentation on the modified method needs to be submitted for the detection levels (minimum and practical quantifiable limits), linear calibration of the method within a specified analytical range, and matrix spikes for accuracy and precision.
- Table 5-9 in the AMR lists herbicides with different detection limits than those in the EMA laboratory data sheets. Laboratory QA/QC data on the detection limits for each constituent should be submitted in accordance with California Department of Health Services and ILRP requirements.
- The scan for herbicides listed in Table 5-9 did not include thiobencarb nor simazine for July. The September herbicide scan did not analyze for bispyribac-sodium. These missing herbicides were not listed on the request for analysis for the July and September chain of custody forms.

General Comments on AMR

- The August DO field measurements were discarded due to possible instrument malfunction, although the instrument had just been serviced. The lowest field measured DO for that day was 0.05 mg/L at CBD1 and the highest reading was 4.39 mg/L at JS. The August samples were analyzed for biological oxygen demand (BOD) and chemical oxygen demand (COD) that showed non-detects for all samples. The DO measurements for samples shipped to AQUA-Science had readings of 8 mg/L or greater, but were assumed to be non-representative due to mixing when samples were consolidated at the sampling site.

It is apparent that there was a malfunction of the YSL, particularly considering historical DO readings and the estimated flow from on-site stream flow measurements. The estimated flow at CBD1 was 1031 cfs, while the JS estimated flow was 52 cfs. The use of BOD and COD measurements to indicate adequate DO levels requires that the raw lab data be submitted. In September, two meters were used for DO measurements to ensure quality control.

The following items are noted as actions taken by the CRC that exceed the requirements of the MRP Order No. R5-2004-0839 that expired October 2007:

- Toxicity tests for the water column and sediments were not required for 2007. The CRC extended sampling for *Pimephales*, *Ceriodaphnia*, and *Hyaella* to obtain three complete years of data. The *Selenastrum* toxicity testing was continued, but was modified to include a herbicide scan and copper analyses in July and September for certain sites in order to identify the possible cause of toxicity.

- The field log format was changed in May 2007 to provide instructions on when second readings for pH and dissolved oxygen (DO) were to be taken. In addition, there were instructions for the field crew to provide more detailed information on water body conditions that would help explain pH and DO readings.
- Tests were performed for biochemical oxygen demand (BOD) and chemical oxygen demand (COD) in August 2007 to determine if field DO readings were inaccurate. The following month, two instruments were used to measure DO to ensure erroneous readings were not being taken.
- Several sediment sample containers taken 11 July were found broken upon receipt at the lab on 12 July. On 16 July, resampling occurred at the sites with broken bottles. During the September sampling, sediment samples were not overnight expressed to the lab. These samples arrived at the lab above the hold temperature. Duplicate samples were sent from AQUA-Science the following day.

The CRC and CH2MHill are commended for the above actions that required forethought and planning to address problems encountered during sampling and sample analysis. The Regional Water Board staff appreciates these efforts.

Attachments:

Table 1: List of herbicides scanned in July and September

Table 2: Selenastrum toxicity results

Table 3: Required sample receipt log-in data


TABLE 1. List of herbicides scanned in July and September

Herbicide	EPA Method	Reporting Limit (RL)*
Atrazine	8141A	0.5 µg/L
Bensulfuron-methyl	8081A	0.5 µg/L
Bispyribac sodium	8151A(m)	0.5 µg/L
Carfentrazone	8081A	0.1 µg/L
Clomazone	8141A	1 µg/L
Diuron	632	0.5 µg/L
Glyphosate	547	10 µg/L
Halosulfuron methyl	8081A	0.1 µg/L
Molinate	8141A	1 µg/L
Pendimethalin	8081A	0.2 µg/L
Penoxsulam	632	5 µg/L
Propanil	8081A	0.05 µg/L
Simazine	8141A	0.5 µg/L
Thiobencarb	8141A	2 µg/L
Triclopyr TEA	8151A	0.05 µg/L

* Based on laboratory analytical sheets

TABLE 2. Selenastrum toxicity results

Month	Event	Sample Date	96 Hour % Growth as Compared to Control				
			BS1	CBD1	CBD5	JS	SSB
February	Original	02/27/07	97%	76%	79%	110%	119%
April	Original	04/24/07	86%	85%	91%	97%	96%
May	Original	05/08/07	84%	67%	99%	98%	28%
	Resample	05/15/07					106%
June	Original	06/05/07	86%	25%	79%	66%	8%
	Resample	06/12/07		8%			36%
July	Original	07/10/07	100%	86%	100%	80%	74%
August	Original	08/21/07	125%	109%	118%	105%	115%
September	Original	09/18/07	88%	89%	94%	95%	70%
October	Original	10/23/07	100%	105%	115%	102%	104%

 indicates statistically significant toxicity observed compared to control


 indicates resample not required (survival ≥ 50%)

TABLE 3. Required sample receipt log-in data

List of California Rice Commission samples under the Irrigated Lands Regulatory Program submitted by Kleinfelder. Sample receipt log-in data such as temperature, pH, DO, alkalinity, hardness, EC and ammonia required for each sample.

Test ID Test Date (Sample Date)	Test Site
07-01 2/28/07 (2/27/07)	JS AQ0207 BS1 AQ0207 CBD1 AQ0207 CBD1 AQ0207 SSB AQ0207
07-02 4/25/07 (4/24/07)	JS AS0407 BS1 AS0407 CBD5 AS0407 CBD1 AS0407 SSB AS0407
07-03 5/9/07 (5/8/07)	JS AS0507 BS1 AS0507 CBD5 AS0507 CBD1 AS0507 SSB AS0507
07-03R 5/16/07 (5/15/07)	SSB AS0507-2
07-04 6/6/07 (6/5/07)	JS AS0607 BS1 AS0607 CBD5 AS0607 CBD1 AS0607 SSB AS0607
07-04R 6/13/07 (6/12/07)	CBD1 AS0607RS SSB AS0607RS
07-05 7/10/07 (7/11/07)	JS AS0707 BS1 AS0707 CBD5 AS0707 CBD1 AS0707 SSB AS0707
07-06 8/22/07 (8/21/07)	JS AS0807 BS1 AS0807 CBD5 AS0807 CBD1 AS0807 SSB AS0807
07-07 9/19/07 (9/18/07)	JS AQ0907 BS1 AQ0907 CBD5 AQ0907 CBD1 AQ0907 SSB AQ0907
07-07RS 9/21/07 (9/21/07)	CBD1 AQ0907-2
07-08 10/24/07 (10/23/07)	JS AS1007 BS1 AS 1007 CBD5 AS1007 CBD1 AS1007 SSB AS 1007